NODE=M042

$f_2(2150)$

$I^G(J^{PC}) = 0^+(2^{++})$

This entry was previously called T_0.

NODE=M042

$f_2(2150)$ MASS

NODE=M042205

$f_2(2150)$ MASS, COMBINED MODES (MeV)

NODE=M042M
NODE=M042M

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
2157±12 OUR AVERAGE Includes data from the datablock that follows this one.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2170± 6	80k	[1] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
2123^{+15}_{-33}		[2] LONGACRE	04	RVUE	22 $\pi^- p \to \phi\phi n$, 450 $pp \to p_f 4\pi p_s$

[1] Statistical error only. NODE=M042M;LINKAGE=ST
[2] From a four pole K-matrix reanalysis of ETKIN 88 and BARBERIS 00C data. NODE=M042M;LINKAGE=A

$\eta\eta$ MODE

NODE=M042M3
NODE=M042M3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
2157±12 OUR AVERAGE				
2151±16	BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
2175±20	PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$
2130±35	SINGOVSKI	94	GAM4	450 $pp \to pp2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2140±30	[3] ABELE	99B	CBAR	1.94 $\overline{p}p \to \pi^0\eta\eta$
2104±20	[4] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$

[3] Spin not determined. NODE=M042M3;LINKAGE=K3
[4] No J^{PC} determination. NODE=M042M3;LINKAGE=A

$\eta\pi\pi$ MODE

NODE=M042M4
NODE=M042M4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2135±20±45	[5] ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \to \eta 3\pi^0$

[5] ANISOVICH 00E recommends to withdraw ADOMEIT 96 that assumed a single $J^P = 2^+$ resonance. NODE=M042M4;LINKAGE=AD

$\overline{p}p \to \pi\pi$

NODE=M042M1
NODE=M042M1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 2090	[6] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 2120	[7] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 2170	[8] MARTIN	80B	RVUE	
~ 2150	[8] MARTIN	80C	RVUE	
~ 2150	[9] DULUDE	78B	OSPK	1–2 $\overline{p}p \to \pi^0\pi^0$

OCCUR=2

[6] OAKDEN 94 makes an amplitude analysis of LEAR data on $\overline{p}p \to \pi\pi$ using a method based on Barrelet zeros. This is solution A. The amplitude analysis of HASAN 94 includes earlier data as well, and assume that the data can be parametrized in terms of towers of nearly degenerate resonances on the leading Regge trajectory. See also KLOET 96 and MARTIN 97 who make related analyses. NODE=M042M1;LINKAGE=B
[7] From solution B of amplitude analysis of data on $\overline{p}p \to \pi\pi$. NODE=M042M1;LINKAGE=BB
[8] $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M042M1;LINKAGE=P
[9] $I^G(J^P) = 0^+(2^+)$ from partial-wave amplitude analysis. NODE=M042M1;LINKAGE=L

S-CHANNEL $\overline{p}p$, $\overline{N}N$ or $\overline{K}K$

NODE=M042M2
NODE=M042M2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
2139^{+8}_{-9}	[10] EVANGELIS...	97	SPEC		0.6-2.4 $\overline{p}p \to K^0_S K^0_S$
~ 2190	[10] CUTTS	78B	CNTR		0.97–3 $\overline{p}p \to \overline{N}N$
2155±15	[10,11] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
2193± 2	[10,12] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel

[10] Isospins 0 and 1 not separated. NODE=M042M2;LINKAGE=I
[11] From a fit to the total elastic cross section. NODE=M042M2;LINKAGE=E
[12] Referred to as T or T region by ALSPECTOR 73. NODE=M042M2;LINKAGE=M

$K\overline{K}$ MODE

NODE=M042M5
NODE=M042M5

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
2200±13	VLADIMIRSK...06		SPEC	40 $\pi^- p \to K^0_S K^0_S n$
2150±20	ABLIKIM	04E	BES2	$J/\psi \to \omega K^+ K^-$
2130±35	BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+ K^-$

f_2(2150) WIDTH

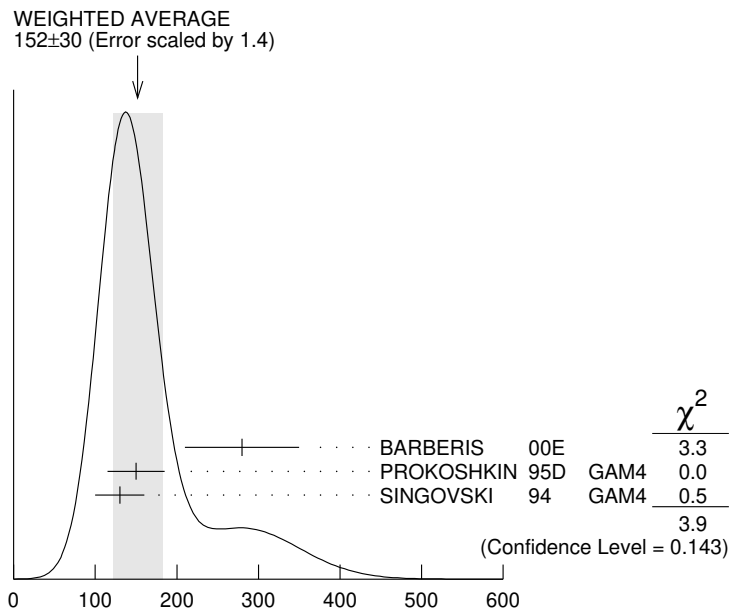
NODE=M042210

f_2(2150) WIDTH, COMBINED MODES (MeV)

NODE=M042W
NODE=M042W

VALUE (MeV)	EVTS	DOCUMENT ID		TECN	COMMENT
152±30 OUR AVERAGE Includes data from the datablock that follows this one. Error includes scale factor of 1.4. See the ideogram below.					
• • • We do not use the following data for averages, fits, limits, etc. • • •					
182±11	80k	[13] UMAN	06	E835	5.2 $\overline{p}p \to \eta\eta\pi^0$
294^{+56}_{-55}		[14] LONGACRE	04	RVUE	22 $\pi^- p \to \phi\phi n$, 450 $pp \to p_f 4\pi p_s$

[13] Statistical error only. NODE=M042W;LINKAGE=ST
[14] From a four pole K-matrix reanalysis of ETKIN 88 and BARBERIS 00C data. NODE=M042W;LINKAGE=A



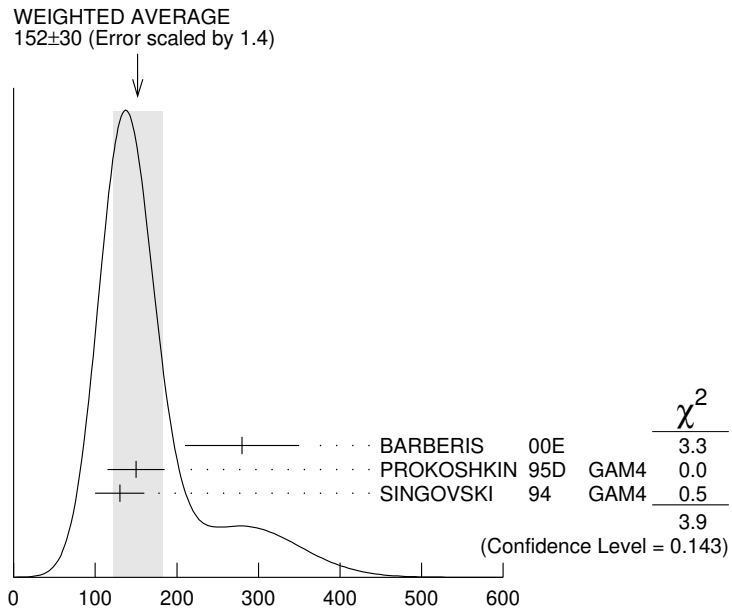
f_2(2150) width, comibined modes (MeV)

$\eta\eta$ MODE

NODE=M042W3
NODE=M042W3

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
The data in this block is included in the average printed for a previous datablock.				
152±30 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.				
280±70	BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
150±35	PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp 2\eta$
130±30	SINGOVSKI	94	GAM4	450 $pp \to pp 2\eta$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
310±50	[15] ABELE	99B	CBAR	1.94 $\overline{p}p \to \pi^0\eta\eta$
203±10	[16] ARMSTRONG	93C	E760	$\overline{p}p \to \pi^0\eta\eta \to 6\gamma$

[15] Spin not determined. NODE=M042W3;LINKAGE=K3
[16] No J^{PC} determination. NODE=M042W3;LINKAGE=A



$\eta\pi\pi$ MODE

NODE=M042W4
NODE=M042W4

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$250 \pm 25 \pm 45$	[17] ADOMEIT	96	CBAR	0	1.94 $\overline{p}p \to \eta 3\pi^0$

[17] ANISOVICH 00E recommends to withdraw ADOMEIT 96 that assumed a single $J^P = 2^+$ resonance. NODE=M042W4;LINKAGE=AD

$\overline{p}p \to \pi\pi$

NODE=M042W1
NODE=M042W1

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
250 OUR ESTIMATE				→ UNCHECKED ←
• • • We do not use the following data for averages, fits, limits, etc. • • •				
~ 70	[18] OAKDEN	94	RVUE	0.36–1.55 $\overline{p}p \to \pi\pi$
~ 250	[19] MARTIN	80B	RVUE	
~ 250	[19] MARTIN	80C	RVUE	
~ 250	[20] DULUDE	78B	OSPK	1–2 $\overline{p}p \to \pi^0\pi^0$

[18] See however KLOET 96 who fit $\pi^+\pi^-$ only and find waves only up to $J = 3$ to be important but not significantly resonant. NODE=M042W1;LINKAGE=CC

[19] $I(J^P) = 0(2^+)$ from simultaneous analysis of $p\overline{p} \to \pi^-\pi^+$ and $\pi^0\pi^0$. NODE=M042W1;LINKAGE=P

[20] $I^G(J^P) = 0^+(2^+)$ from partial-wave amplitude analysis. NODE=M042W1;LINKAGE=L

S-CHANNEL $\overline{p}p$, $\overline{N}N$ or $\overline{K}K$

NODE=M042W2
NODE=M042W2

VALUE (MeV)	DOCUMENT ID		TECN	CHG	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
56^{+31}_{-16}	[21] EVANGELIS...	97	SPEC		0.6-2.4 $\overline{p}p \to K^0_S K^0_S$
135 ± 75	[22,23] COUPLAND	77	CNTR	0	0.7–2.4 $\overline{p}p \to \overline{p}p$
98 ± 8	[23] ALSPECTOR	73	CNTR		$\overline{p}p$ S channel

[21] Isospin 0 and 2 not separated. NODE=M042W2;LINKAGE=F

[22] From a fit to the total elastic cross section. NODE=M042W2;LINKAGE=E

[23] Isospins 0 and 1 not separated. NODE=M042W2;LINKAGE=I

$K\overline{K}$ MODE

NODE=M042W5
NODE=M042W5

VALUE (MeV)	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
91 ± 62	VLADIMIRSK...06		SPEC	40 $\pi^- p \to K^0_S K^0_S n$
150 ± 30	ABLIKIM	04E	BES2	$J/\psi \to \omega K^+ K^-$
270 ± 50	BARBERIS	99	OMEG	450 $pp \to p_s p_f K^+ K^-$

$f_2(2150)$ DECAY MODES

NODE=M042215;NODE=M042

	Mode	Fraction (Γ_i/Γ)	
Γ_1	$\pi\pi$		DESIG=1
Γ_2	$\phi\phi$		DESIG=7
Γ_3	$\eta\eta$	seen	DESIG=2;OUR EST;→ UNCHECKED ←
Γ_4	$K\overline{K}$	seen	DESIG=3;OUR EST;→ UNCHECKED ←
Γ_5	$f_2(1270)\eta$	seen	DESIG=4;OUR EST;→ UNCHECKED ←
Γ_6	$a_2(1320)\pi$	seen	DESIG=5;OUR EST;→ UNCHECKED ←
Γ_7	$p\overline{p}$	seen	DESIG=6

$f_2(2150)$ BRANCHING RATIOS

NODE=M042220

$\Gamma(K\overline{K})/\Gamma(\eta\eta)$ — Γ_4/Γ_3

NODE=M042R1
NODE=M042R1

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
1.28±0.23		BARBERIS	00E		450 $pp \to p_f \eta\eta p_s$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.1	95	[24] PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$

[24] Using data from ARMSTRONG 89D.

NODE=M042R1;LINKAGE=A

$\Gamma(\pi\pi)/\Gamma(\eta\eta)$ — Γ_1/Γ_3

NODE=M042R2
NODE=M042R2

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.33	95	[25] PROKOSHKIN	95D	GAM4	300 $\pi^- N \to \pi^- N 2\eta$, 450 $pp \to pp2\eta$

[25] Derived from a $\pi^0\pi^0/\eta\eta$ limit.

NODE=M042R2;LINKAGE=A

$\Gamma(f_2(1270)\eta)/\Gamma(a_2(1320)\pi)$ — Γ_5/Γ_6

NODE=M042R3
NODE=M042R3

VALUE	DOCUMENT ID		TECN	COMMENT
0.79±0.11	[26] ADOMEIT	96	CBAR	1.94 $\overline{p}p \to \eta 3\pi^0$

[26] Using B($a_2(1320) \to \eta\pi$) = 0.145

NODE=M042R3;LINKAGE=A

$\Gamma(p\overline{p})/\Gamma_{total}$ — Γ_7/Γ

NODE=M042R04
NODE=M042R04

VALUE	EVTS	DOCUMENT ID		TECN	COMMENT
seen	73	ALEXANDER	10	CLEO	$\psi(2S) \to \gamma p\overline{p}$

$f_2(2150)$ REFERENCES

NODE=M042

ALEXANDER	10	PR D82 092002	J.P. Alexander *et al.*	(CLEO Collab.)	REFID=53525
UMAN	06	PR D73 052009	I. Uman *et al.*	(FNAL E835)	REFID=51063
VLADIMIRSK...	06	PAN 69 493	V.V. Vladimirsky *et al.*	(ITEP, Moscow)	REFID=51191
		Translated from YAF 69 515.			
ABLIKIM	04E	PL B603 138	M. Ablikim *et al.*	(BES Collab.)	REFID=50174
LONGACRE	04	PR D70 094041	R.S. Longacre, S.J. Lindenbaum	(BNL, CUNY)	REFID=50341
ANISOVICH	00E	PL B477 19	A.V. Anisovich *et al.*		REFID=47945
BARBERIS	00C	PL B471 440	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47959
BARBERIS	00E	PL B479 59	D. Barberis *et al.*	(WA 102 Collab.)	REFID=47961
ABELE	99B	EPJ C8 67	A. Abele *et al.*	(Crystal Barrel Collab.)	REFID=46904
BARBERIS	99	PL B453 305	D. Barberis *et al.*	(Omega Expt.)	REFID=46921
EVANGELIS...	97	PR D56 3803	C. Evangelista *et al.*	(LEAR Collab.)	REFID=45687
MARTIN	97	PR C56 1114	B.R. Martin, G.C. Oades	(LOUC, AARH)	REFID=45685
ADOMEIT	96	ZPHY C71 227	J. Adomeit *et al.*	(Crystal Barrel Collab.)	REFID=45202
KLOET	96	PR D53 6120	W.M. Kloet, F. Myhrer	(RUTG, NORD)	REFID=45212
PROKOSHKIN	95D	PD 40 495	Y.D. Prokoshkin	(SERP) IGJPC	REFID=44647
		Translated from DANS 344 469.			
HASAN	94	PL B334 215	A. Hasan, D.V. Bugg	(LOQM)	REFID=44103
OAKDEN	94	NP A574 731	M.N. Oakden, M.R. Pennington	(DURH)	REFID=45210
SINGOVSKI	94	NC A107 1911	A.V. Singovsky	(SERP)	REFID=44648
ARMSTRONG	93C	PL B307 394	T.A. Armstrong *et al.*	(FNAL, FERR, GENO+)	REFID=43587
ARMSTRONG	89D	PL B227 186	T.A. Armstrong, M. Benayoun	(ATHU, BARI, BIRM+)	REFID=41010
ETKIN	88	PL B201 568	A. Etkin *et al.*	(BNL, CUNY)	REFID=40285
MARTIN	80B	NP B176 355	B.R. Martin, D. Morgan	(LOUC, RHEL) JP	REFID=21838
MARTIN	80C	NP B169 216	A.D. Martin, M.R. Pennington	(DURH) JP	REFID=21837
CUTTS	78B	PR D17 16	D. Cutts *et al.*	(STON, WISC)	REFID=21733
DULUDE	78B	PL 79B 335	R.S. Dulude *et al.*	(BROW, MIT, BARI) JP	REFID=21850
COUPLAND	77	PL 71B 460	M. Coupland *et al.*	(LOQM, RHEL)	REFID=21830
ALSPECTOR	73	PRL 30 511	J. Alspector *et al.*	(RUTG, UPNJ)	REFID=21813